Space Weather Forecast

Issued on Friday, 04 August 2023 at 13:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate class flares (R1-R2; Minor-Moderate radio blackouts) likely Day 1 (04 Aug) but risk reducing. Coronal Mass Ejection effects likely with a chance of G1/Minor Storm activity throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity over the past 24 hours has remained at Moderate levels with one Moderate class flare observed. Nine numbered sunspot regions feature on the visible disc. The largest region likely remains the complex on the southwest limb though it is now transiting off the visible disk. A region in the northwest is the second largest and has also seen little significant change in recent hours, with minor reorganisation of the intermediate spots. Remaining regions, including those that have recently rotated on from the eastern limb, appear generally stable or are in slow and erratic decay.

The Moderate flare from the northwest disk around 04/0420 UTC produced a CME (coronal mass ejection) which has been modelled as presenting a risk of a glancing blow into Day 4 (7th Aug).

Solar Wind / Geomagnetic Activity: The solar wind was slow to slightly elevated, generally between 330 and 350 km/s but increasing to 420-450km/s from around 04/0900 UTC. The total interplanetary magnetic field strength (Bt) was at weak levels to start becoming Moderate from 03/1430 UTC, and occasionally Strong from 04/0700 UTC following another upwards step change. The north-south component, Bz, was generally weakly positive but with a moderate southward directed orientation between 04/0700 UTC and 04/1130 UTC. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was at background levels throughout.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is likely to be Low to Moderate, with the most likely in the immediate term from the departing region on the southwest limb.

Solar Wind / Geomagnetic Activity: The Geomagnetic forecast remains complex with multiple CME (coronal mass ejection) impacts possible. Glancing CME influence anticipated on Day 1 (04 Aug), possibly already being felt. A CME which left the Sun around 02/0900 UTC is considered to arrive Day 2 (5th Aug) or perhaps early into day 3 (6th Aug). A recent flare also produced a CME which has been modelled as presenting a risk of a glancing blow into Day 4 (7th Aug).

Solar winds have been generally slow, with some minor enhancement being felt from likely connection to a weak high speed stream (HSS). In the absence of any CME enhancement solar

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winds most likely remaining similar though the period. CME impacts however, most reliably from the 02/0900 UTC CME, could see solar winds reaching slightly elevated or perhaps elevated levels at times, 500-550km/s, particularly if they combine with HSS enhancement. Geomagnetic activity generally Quiet (Kp 1-2) but Unsettled to Active (Kp 3-4) intervals expected and a chance (20-30%) of G1/Minor Storm intervals throughout.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to remain at background levels. There is a slight chance of further enhancements from any larger flares that occur, mainly from the complex region rotating across the southwest limb in the near term.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	30	30	20
Strong	G3	No	1	5	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	40	30	30
Very Active	R3 to R5 X	No	10	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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